BHARAT HEAVY ELECTRICALS LTD.,
CORPORATE R&D DIVISION
VIKAS NAGAR, HYDERABAD-500093 (INDIA)

Enquiry No. :

Date : **16 Aug,2009**

PURCHASE SECTION
PHONE 0091 40 2377 8474
FAX 0091 40 2377 6320
Mr. P.K. Kakkar
pkkakkar@bhelrnd.co.in

TECHNICAL SECTION
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Contact: Mr. S.Rengarajan or Dr A. Bhoomaiah
E-mail: srenga@bhernd.co.in or bhooma@bhelrnd.co.in

SPEC.NO.
G&E:09:01/01

SPECIFICATION CUM COMPLIANCE CERTIFICATION FOR GROUNDING & EARTHING SYSTEM

Important

1. **Vendor must submit complete information against clauses No 9.0 and 10.0 The offer meeting this clause would only be processed.**
2. The offer and all documents enclosed with offer should be in **English language only**.
3. BHEL reserves the right to verify the information submitted by the vendor. **The offer with false/ incorrect/incomplete information may be rejected**.
4. Vendor shall sign and stamp all sheets
6. Revised technical bid may be necessary should the specification needs up gradation/ modification on technical scrutiny.
7. Vendor must respond to all points in the specification.

ADDRESS OF THE SUPPLIER :	**ADDRESS OF THE INDIAN AGENT :**
TELEPHONE NOS.:	**TELEPHONE NOS.:**
FAX NOS.:	**FAX NOS.:**
CONTACT PERSON:	**CONTACT PERSON:**
E-MAIL ADDRESS :	**E-MAIL ADDRESS :**

SCOPE: **Execution of grounding & earthing system for the UHV test laboratory as per the specification given below.**

Serial No.	SYSTEM REQUIREMENT	ACTION REQUIRED	OFFERED BY VENDOR	DEVIATIONS (IF ANY, ELSE PRINT NONE)	REMARKS(Only on deviations)
1.0	**Requirement of the grounding system:** The function of the grounding system is to provide a path for the fault current that is generated due to the abnormal voltage rise in the ground return path during impulse or power frequency flashover that can occur in a high voltage test hall. It is a transient voltage and must be grounded	**Vendor to note**			
1.1	**Responsibility:** It is a special work with electrical engineering background.. The responsibility of making the required grounding system rests on the vendor, however, the vendor can approach the indenter for any technical helps.	**Vendor to confirm**			

Serial No.	SYSTEM REQUIREMENT	ACTION REQUIRED	OFFERED BY VENDOR	DEVIATIONS (IF ANY, ELSE PRINT NONE)	REMARKS(Only on deviations)
1.2	**Resistivity of soil:** Geological survey of India has made a detailed survey of the earth resistance at the site. The soil up to a depth of 5 metre can be considered as a single layer with an average resistivity value of **50 ohm-metre.**	**Vendor to consider as an input parameter.**			
2.0	**Dimensions:** Dimensions of all the materials used for the grounding system are given in the enclosed drawings. The dimensional tolerances are as per the market standards. .	**Vendor to note**			
3.0	**Parts of the grounding system:** The grounding system must consist of two parts. i.e. i) A ground mat for the return current to flow back to the source, also to provide a uniform reference potential and to maintain an almost uniform voltage by distributing the fault current uniformly and ii) A ground electrode system to send the fault current from the ground mat into the true ground.	**Vendor to note**			
3.1	**Details of ground electrode system:** The ground electrode system consists of a number of vertical electrodes (25 copper and 15 GI pipes) that are interconnected electrically by means of a copper grid (Refer 4.0), formerd by brazing. . The ground electrode system should cover an area as indicated in **Dwg.309S&TUHV1000**	**Vendor to note**			
3.2	**Array of vertical electrodes:** The optimum number of vertical electrodes is arrived at as 40 with a given spacing between adjusantelectrodes as shown in **Dwg 309S&TUHV1000.**	**Vendor to note**			
3.3	**Details of individual vertical electrode:** The individual vertical electrode is a standard available pipe. 25tubes are of copper and the rest 15 are class 'C' GI pipes as indicated in **Dwg. No . 309S & TUHV1010**. Length of pipes = 6 m (+/- 0.2 m). OD = 50 mm (+/- 0.5 mm), thickness = 5 to 6 mm. as availble in market (m means metres in length . mm means millimeter). Out of the total length, up to a length of 5m , the pipe is burried into the natural soil. Each pipe should have 10 mm holes on four sides at 90° and at an intervel of half metre in the buried portion of 5 meters length **Dwg.309S&TUHV1012 &309S&TUHV1013** . However at any given horizontal plane only one hole should be provided. It means that the position of holes must be staggered for a distance of 0.25 m from one side to next side. These holes shall be used for wetting the soil with water.The copper pipe must be galvanized by hot dip galvanizing up to a length of 5 m.	**Vender to conform**			
3.4	**Method of burying individual electrodes:** Each pipe has to be driven vertically into ground by means of a power hammer or by an equivalent mechanical force. In order to make the driving easy, initially, a vertical bore of about 46 mm up to a depth of 5 m shall be made in the ground. Subsequently, the grounding electrode has to be driven. At the end of the process, the lower flange which is brazed or welded to the vertical pipe (Ref 3.7) is in line with the natural soil. This level is 0.5 metres below the present natural soil level. **The contact of the side of the pipe with the ground is most important so that the required contact resistance is maintained.** Water may be used during driving. In case a rock is met after 4 m, the driving may be stopped. In case the rock bed is available before a depth of 4 m, the electrode is taken out and driven nearby. However no such rock bed is found during the soil investigation made by Geological Survey of India.	**Vendor to conform**			

Serial No.	SYSTEM REQUIREMENT	ACTION REQUIRED	OFFERED BY VENDOR	DEVIATIONS (IF ANY, ELSE PRINT NONE)	REMARKS(Only on deviations)
3.5	**Position of copper Grid:** A copper grid has to be laid at a level of 0.5 m below the existing natural soil and brazed to the vertial electrodes.**The removal of soil up to 0.5 m and refiiling will be the scope of BHEL.**	**Vendor to conform**			
3.6	**Flanges for connection between vertical electrode and bottom copper grid/ top copper floor mat:** There are three flanges, which are to be welded/ brazed to each copper pipe. One is at the top for connection purposes. The bottom one is at a place which is 5m from bottom end of the pipe. The centre one is at a distance so as to match the copper floor mat .as shown in **Dwg.309S&TUHV1010.** Similarly GI pipes will have only two flanges one at 5m from the bottom end of the pipe and other at top for connection.**(Dwg.309S&TUHV1012 &309S&TUHV1013)**	**Vendor to conform**			
3.7	**Flange details:** The shape and dimensions of flange are indicated in the drawing . At the centre a hole of about 51 mm diameter is made so that the vertical electrode can be inserted. The fitting is exact so that the flange can be kept in any position and movement by a human hand is possible. The center hole must have a chamfering at the top and bottom so that welding of flange with the pipe is possible. as indicated in **Dwg.309S&TUHV1012**.	**Vendor to conform**			
3.8	**Flange connection:** Further, the flange has two holes suitable for 12 mm dia bolt to connect two copper strips of 50x3mm which are extended from the copper grid They are bolted to the flange with bronze bolts before brazing. The surface of the flange must be painted with black tar or any epoxy paint or covered with M- seal so that the MS to copper joint should not be exposed to moisture. **For copper pipes a similar copper flanges shall be used No epoxy coating is required is required for copper to copper joints.** Details of individual componets are given in **Dwg.309S&TUHV1011**	**Vendor to conform**	3.8		

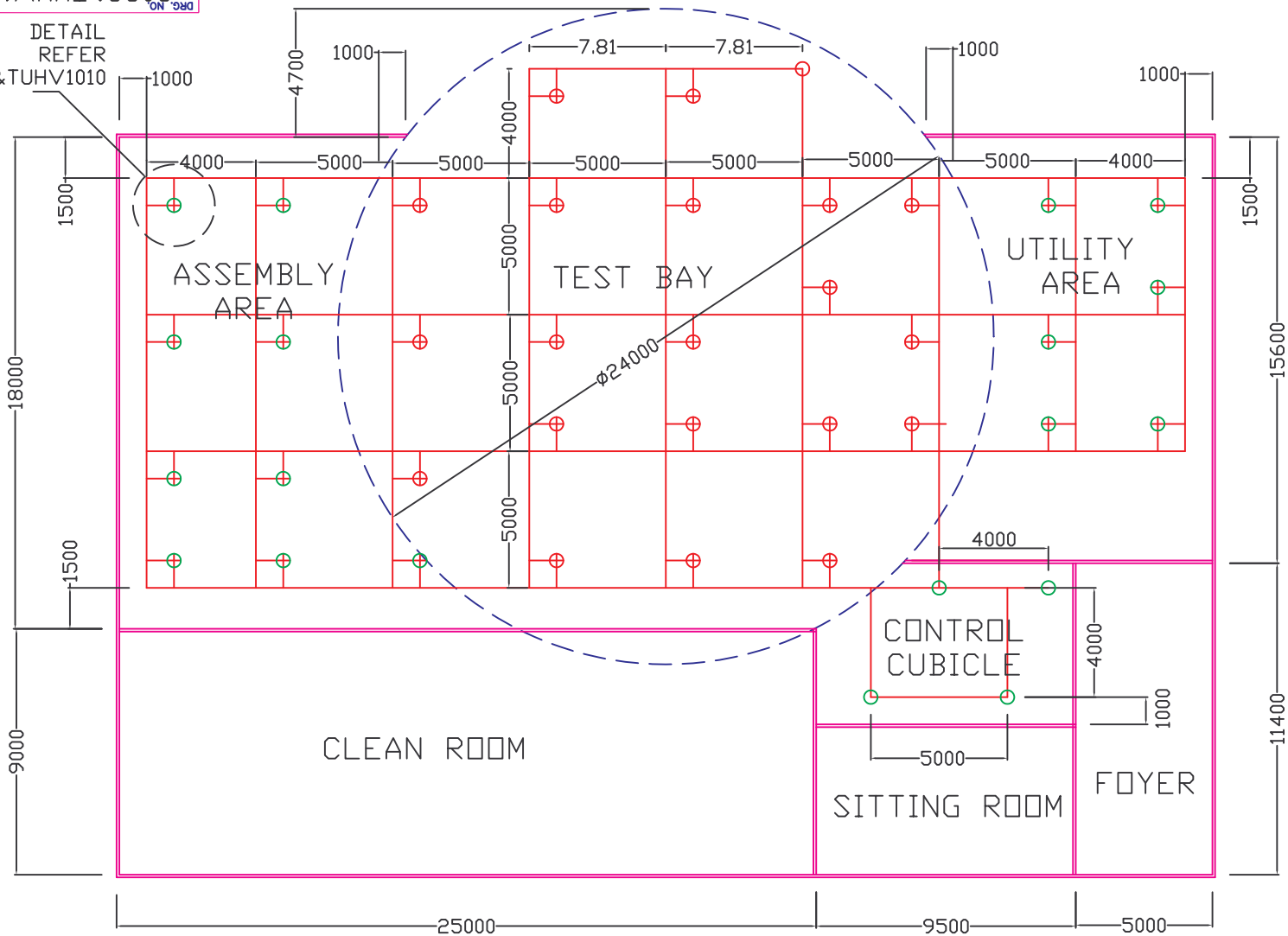
Serial No.	SYSTEM REQUIREMENT	ACTION REQUIRED	OFFERED BY VENDOR	DEVIATIONS (IF ANY, ELSE PRINT NONE)	REMARKS(Only on deviations)
3.9	**Checking of resistance of individual electrode after insertion in to the ground:** Every individual electrode is subjected to earth resistance measurements by the standard three terminal method. The resistance of each electrode must be less or equal to 9 Ohms. In case the resistance value is very high the gaps between the surface and the ground around the vertical electrode (pipe) is treated by **bentonite soil.** This test has to be done in presence of the indenter and approval of the indenter has to be taken before further progress. Also, the total resistance of the entire system after interconnection by copper grid has to be done by the three terminal method and the resistance value must be less or equal to 1 Ohm. Caluculated resistance value of for total system as per the BHEL design is less than 1ohm and the final resistance value as mentioned above has to be achieved. **Hence, vendor can go through BHEL drawings and acertain the resistance of total system (ground electrode system) as 1 Ohm before quoting . The measuring equipment will be arrnged by vendor**	**Vendor to conform**			
3.10	**Ccopper grid of ground electrode system:** The interconnecting copper grid, which is connecting all the vertical electrodes(pipes) is made up of 50 X 3 mm rectangular copper flat (normal electrical grade) as indicated in **Dwg 309S&TUHV1000.**The flat is laid in the natural soil (0.5 m level)on its side but not on its edge. Each length of 24 m is done by a single roll without joints. In case joint has to be made, only one joint is permissible subject to the approval of the indenter at the time of formation. All cross joints are made as lap joints using silver-copper brazing alloy with minimum 40 % silver. A brazing torch can be used for this purpose. The brazing alloy should melt into liquid and fill up the joining surfaces of copper. Before brazing surface of copper should be cleaned with emery paper and cleaned with acetone to remove any dirt, oil or greasy coats. **Also, the copper grid is brazed to the inner wall structure at every 5 m inervel**	**Vendor to conform**			
4.0	**Formation of copper floor mat:** The copper mat is made up of expanded copper mesh of thickness 2 mm with an expansion factor of 5 to 5.5 as indicated in **Dwg309S&TUHV1100**. This must be available in roles. These roles cover the total test bay area of 24x24 m and control cubicle of 4.5x9m. The mat is laid at around 350 mm below the finished floor level and brazed to the middle flange of the vertical electrode(pipe) with a suitable copper brazing. The brazing material shall have the same electrical conductivity as that of copper. The brazing of two adjacent rolls are effected by laying a 12.5 mm x 3mm central copper strip and brazing of edges of copper mesh with central strips has to be done at every 100 mm as indicated in **Dwg 309S&TUHV1100**.	**Vendor to conform**			
5.0	**Interconnection between copper floor mat to vertical pipe:** The middle flange of the vertical electrode which is at a level of around 350 mm below the finished floor is used for this purpose. There are four holes of 10 mm dia at 90^{o}are made in the flange. Then copper strips of 12.5x3 mm and a length of at least 500 mm are brazed to flange at one end and the strips are laid over the concrete surface. Then the mesh is laid over it and brazing has to be done at every 100 mm as indicated in **Dwg 309S&TUHV1100.**	**Vendor to conform**			

Serial No.	SYSTEM REQUIREMENT	ACTION REQUIRED	OFFERED BY VENDOR	DEVIATIONS (IF ANY, ELSE PRINT NONE)	REMARKS(Only on deviations)
6.0	**Earth pit:** Each pipe is terminated in earth pit with an open top end made in the floor as shown in **Dwg 309S&TUHV1200** The purpose of this pit is to approach the top flange for ground connection. Also, it is possible to fill the pipe with water so that the individual resistance of the pipe is reduced. At the top of the pit a metal (Mild steel 5mm thick) cover is provided to avoid any foreign particles, entering in to the pipe and pit. The cover must be painted to avoid rust.	**Vendor to conform**			
7.0	**Laying of control cables:** The control cables are laid inside metal pipes with box termination at both sending end in control cubicle as well near the HV equipment. The metal pipe is brazed to the grounding system at both ends. This is under BHEL's scope..	**vendor to note**			
8.0	**DRAWINGS enclosed: 309S&TUHV1000, 309S&TUHV1010, 309S&TUHV1011, 309S&TUHV1012, 309S&TUHV1013, 309S&TUHV1100 &309S&TUHV1200**	**Vendor to note**			
8.1	**Vendor shall submit a general breakup for materials,Drilling, Driving pipes, laying copper mat & copper mesh,Welding, Brazing, Fabrication, pits preparartion, resistance measurement, and execution cost Etc.**	**Vendor to conform**			
9.0	**Working Requirement:** This work has to be done after the raise of foundation of the building above the natural soil level and during erection of the columns so that no interference of this work with the main civil work . Some part of the grounding i.e. driving vertical electrodes and laying of copper grid (Ground electrode system) has to be done before the floor concreting. Laying of Copper floor mat and interconnecting of floor mat with metal side wall should be done during the concreting of floor. The vendor must coordinate and integrate his work with the main civil contractor. Also this work has to go along with civil work which is expected to be executed around Jan, 2010.	**Vendor has to note and accept this clause**			
10.0	**Qualification of vendor/sub vendor:** The vendor should have a knowledge and experience in the area of grounding & earthing preparation for HV laboratories and or vendor registered with state Electricity Board for substation work will be preferred . Supporting documents in this regard shall be submitted.	**Vendor to conform**			

DRG. NO 309S&TUHV1000

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN METERS)



RED COLOUR INDICATES COPPER
GREEN COLOUR INDICATES M.S

ITEM NO.	DESCRIPTION	STD	DRAWING NO.	IT.NO. / VAR	MATL. CODE / MATL. SPECN.	A C	UNIT	UNIT WT. / QTY.	GS	ZONE

TYPE OF PRODUCT: UHV LAB

NAME OF CUSTOMER

BHARAT HEAVY ELECTRICALS LTD.
CORPORATE R&D, HYDERABAD

	NAME	SIGN.	DATE	NO.OF VAR.
DRN	MURALI		17.07.09	
CKD	BHOOMAIAH		17.07.09	
APPD	RENGARAJAN		17.07.09	

REV.	DATE	ALTERED / CHECKED	REV.	DATE	ALTERED / CHECKED
ZONE			ZONE		

DEPT. ICH | CODE 26 | GRADE OF TOL. DIM. C/M/F | SCALE | WEIGHT(KG)

REF. TO | ITEM NO. | NO.OF ITEMS

TITLE: GROUNDING ELECTRODE SYSTEM

CARD CODE

DRAWING NO. 309S&TUHV1000 | REV.

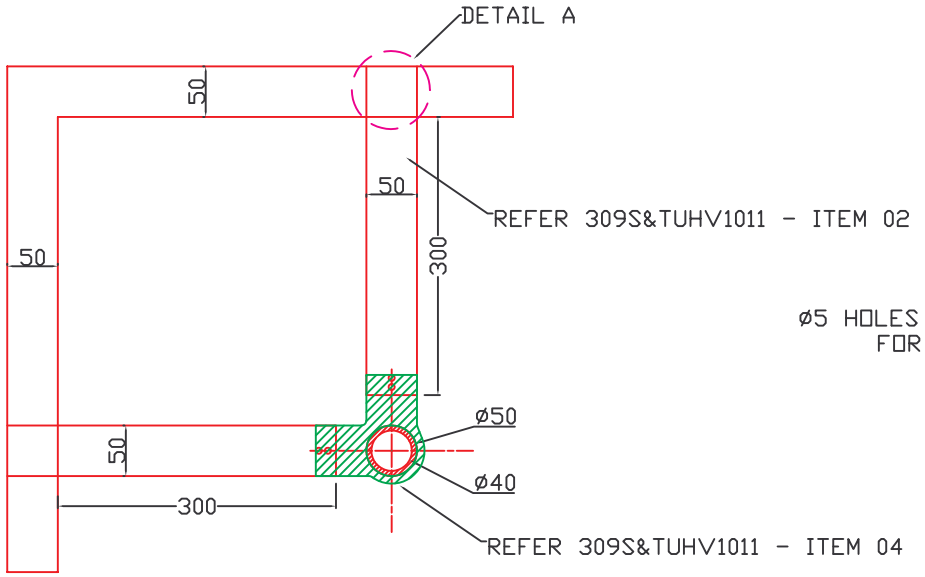
SHEET NO. | NO. OF SHEETS

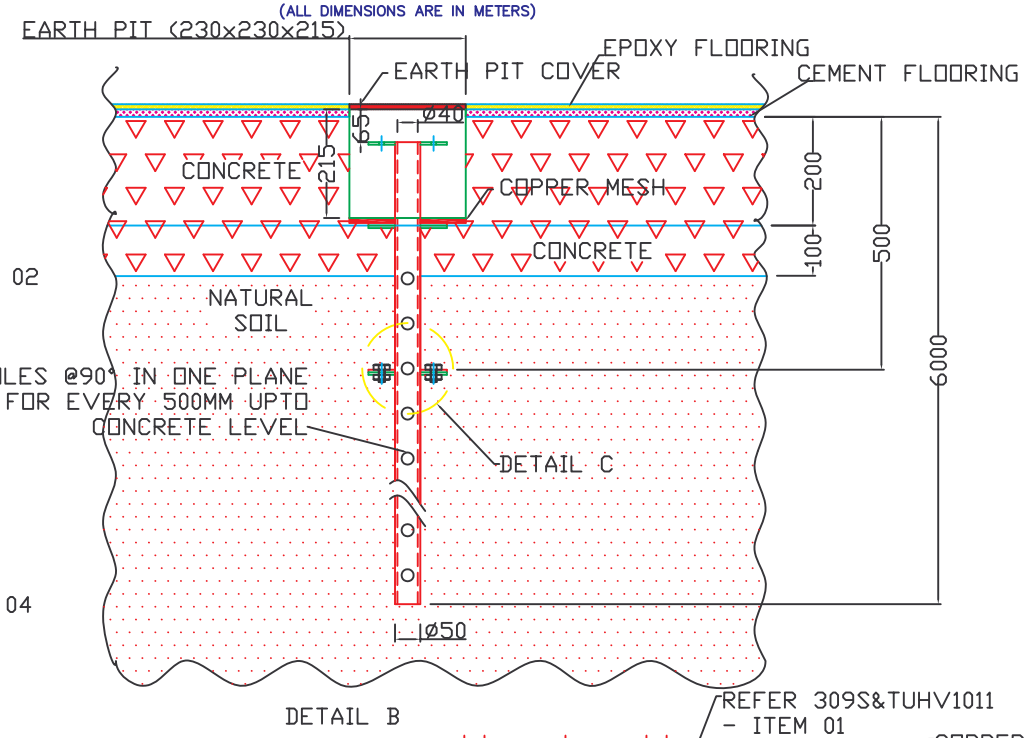
REF. DRG. NO. | SIGN. AND DATE | INVENTORY NO.

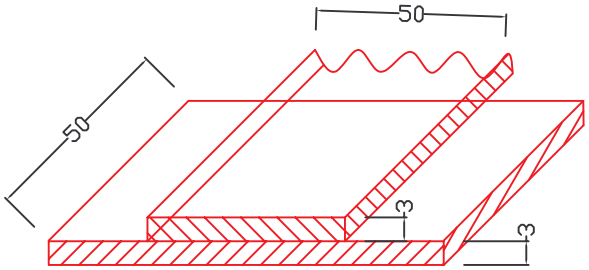
DRG. NO. 309S&TUHV1010

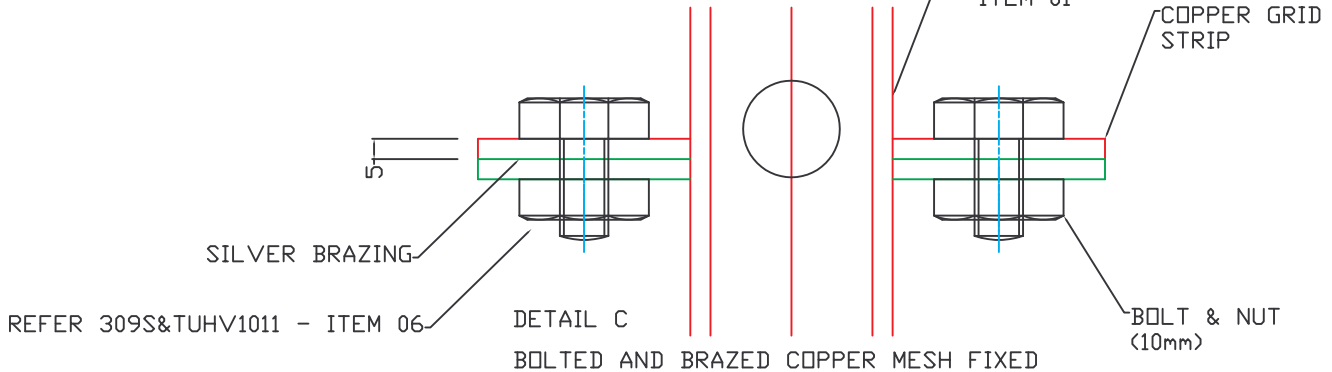
FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN METERS)









RED COLOUR INDICATES COPPER
GREEN COLOUR INDICATES M.S

ITEM NO.	DESCRIPTION	STD	DRAWING NO.	IT.NO. / VAR	MATL. CODE / MATL. SPECN.	A C	UNIT	UNIT WT. / QTY.	GS	ZONE

TYPE OF PRODUCT: UHV LAB
NAME OF CUSTOMER:

BHARAT HEAVY ELECTRICALS LTD.
CORPORATE R&D, HYDERABAD

	NAME	SIGN.	DATE	NO.OF VAR.
DRN	MURALI		17.07.09	
CKD	BHOOMAIAH		17.07.09	
APPD	RENGARAJAN		17.07.09	

REV.	DATE	ALTERED / CHECKED	ZONE

DEPT.	GRADE OF TOL. DIM. C/M/F	SCALE	WEIGHT(KG)	REF. TO	ITEM NO.	NO.OF ITEMS
ICH						

CODE: 26

TITLE: GROUNDING PIPE

CARD CODE

DRAWING NO.: 309S&TUHV1010 REV.

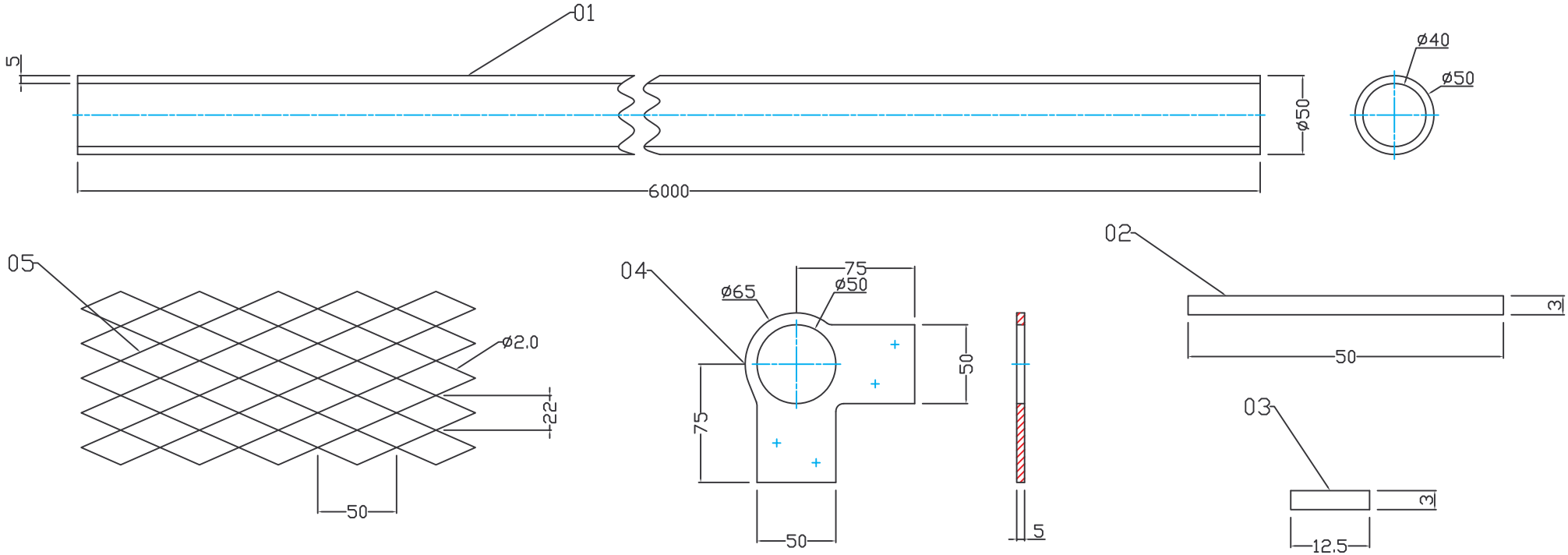
SHEET NO. | NO. OF SHEETS

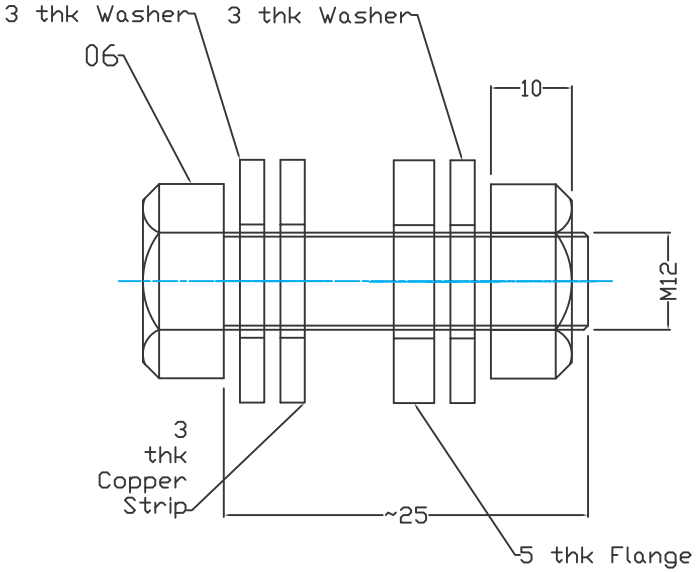
REF. DRG. NO. | SIGN. AND DATE | INVENTORY NO.

DRG. NO. 309S&TUHV1011

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN METERS)





ITEM NO.	DESCRIPTION	STD	DIMENSION	IT.NO. / VAR	MATL. CODE / MATL. SPECN.	A C	UNIT	UNIT WT. / QTY.	GS	ZONE
06	BOLT, NUT, 2 WASHER		M12		BRASS			250 18 Doz.		
05	MESH		50x22Xø2		COPPER			-- 650 Sq.Mtrs		
04	FLANGE		ø65ODXø50ID 5thk		G.I COPPER G.I COPPER			5 10 30 75		
03	STRIP		12.5x3thk		COPPER			120 350 Mtrs		
02	STRIP		50x3thk		COPPER			365 270 Mtrs		
01	TUBE		ø50x6000L 5thk		G.I COPPER G.I COPPER			500 950 15 25		

TYPE OF PRODUCT: UHV LAB

NAME OF CUSTOMER

BHARAT HEAVY ELECTRICALS LTD.
CORPORATE R&D, HYDERABAD

	NAME	SIGN.	DATE	NO.OF VAR.
DRN	MURALI		17.07.09	
CKD	BHOOMAIAH		17.07.09	
APPD	RENGARAJAN		17.07.09	

REV.	DATE	ALTERED / CHECKED	ZONE

REV.	DATE	ALTERED / CHECKED	ZONE

DEPT. ICH | CODE 26 | GRADE OF TOL. DIM. C/M/F | SCALE NTS | WEIGHT(KG)

REF. TO: 309S&TUHV1010, 309S&TUHV1100 | ITEM NO. | NO.OF ITEMS

TITLE: COMPONENTS | CARD CODE

DRAWING NO. 309S&TUHV1011 | REV.

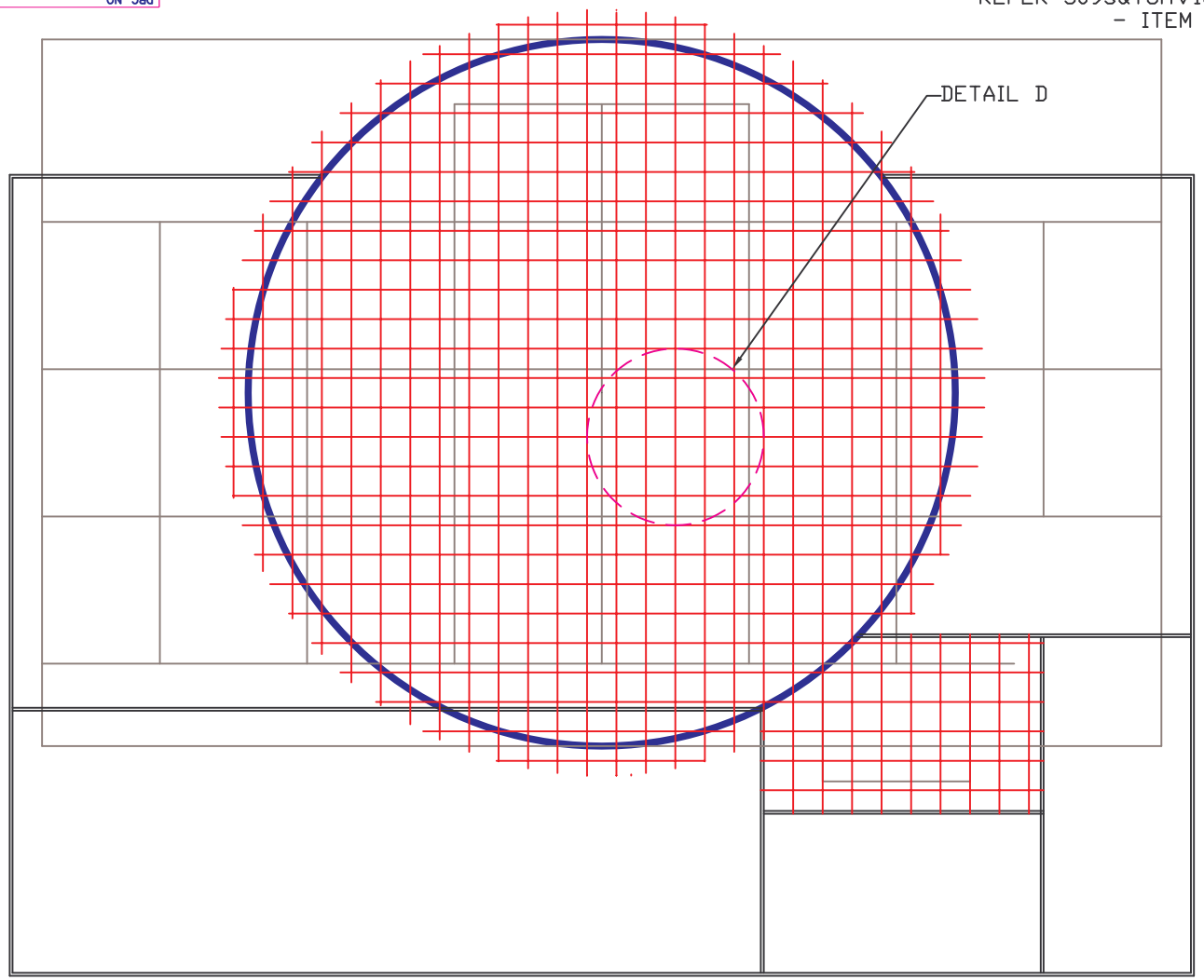
SHEET NO. | NO. OF SHEETS

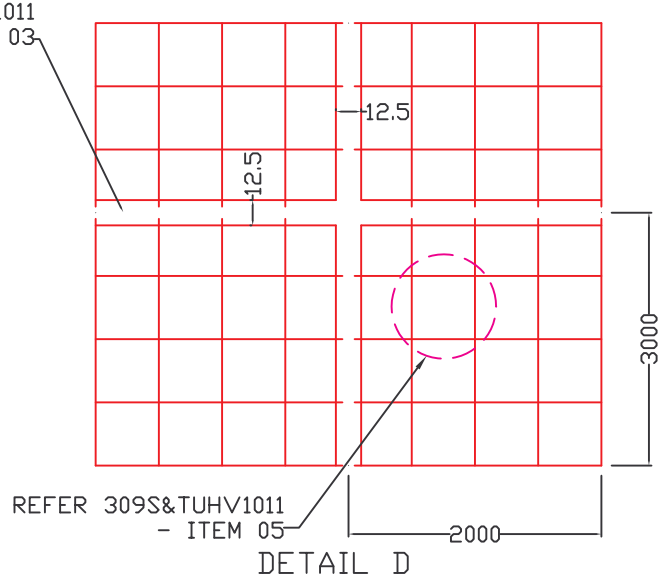
REF. DRG. NO. | SIGN. AND DATE | INVENTORY NO.

DRG. NO 309S&TUHV1100

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN METERS)





THE FRAME IS FIXED TO ONE SECTION OF MAIN COPPER GRID.

2000x3000 mm LONG COPPER MESH TO BE BRAZED TO 12.5x3 mm COPPER STRIPS AS SHOWN AT DETAIL D FOR EVERY 200mm DISTANCE

ITEM NO.	DESCRIPTION	STD	DRAWING NO.	IT.NO. / VAR	MATL. CODE / MATL. SPECN.	A C	UNIT	UNIT WT. / QTY.	GS	ZONE

TYPE OF PRODUCT: UHV LAB

NAME OF CUSTOMER

BHARAT HEAVY ELECTRICALS LTD.
CORPORATE R&D, HYDERABAD

	NAME	SIGN.	DATE	NO.OF VAR.
DRN	MURALI		17.07.09	
CKD	BHOOMAIAH		17.07.09	
APPD	RENGARAJAN		17.07.09	

REV.	DATE	ALTERED / CHECKED	REV.	DATE	ALTERED / CHECKED
ZONE			ZONE		

DEPT. ICH | CODE 26 | GRADE OF TOL. DIM. C/M/F | SCALE | WEIGHT(KG)

REF. TO 309S&TUHV1000 | ITEM NO. | NO.OF ITEMS

TITLE: GROUNDING COPPER MESH

CARD CODE

DRAWING NO. 309S&TUHV1100 | REV.

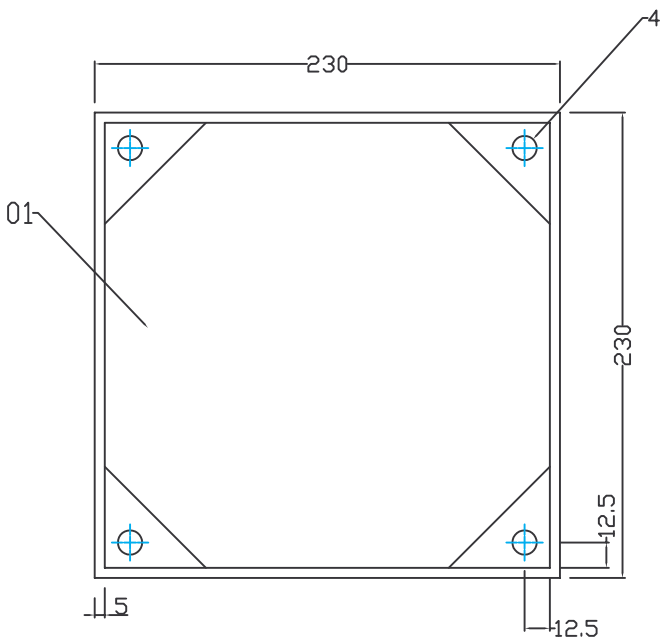
SHEET NO. | NO. OF SHEETS

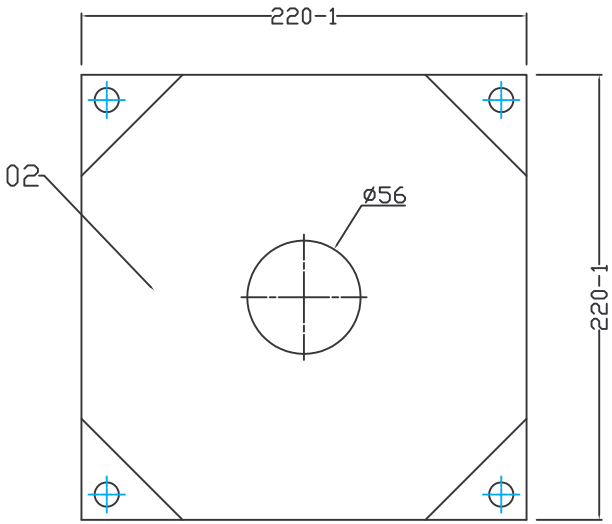
REF. DRG. NO. | SIGN. AND DATE | INVENTORY NO.

DRG. NO 309S&TUHV1200

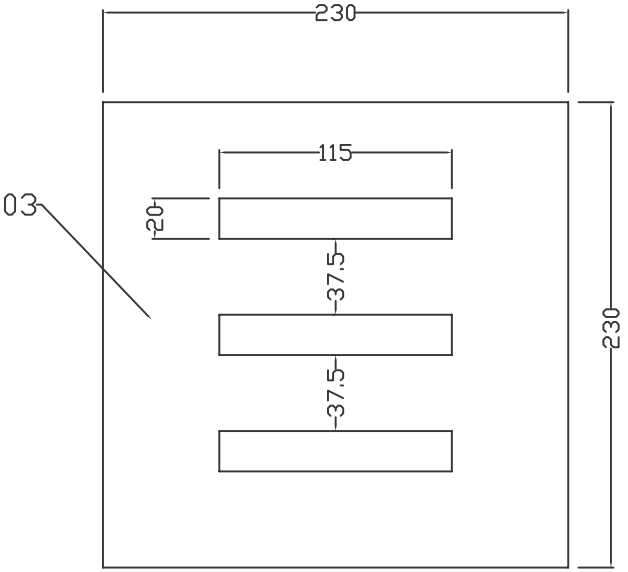
FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN METERS)

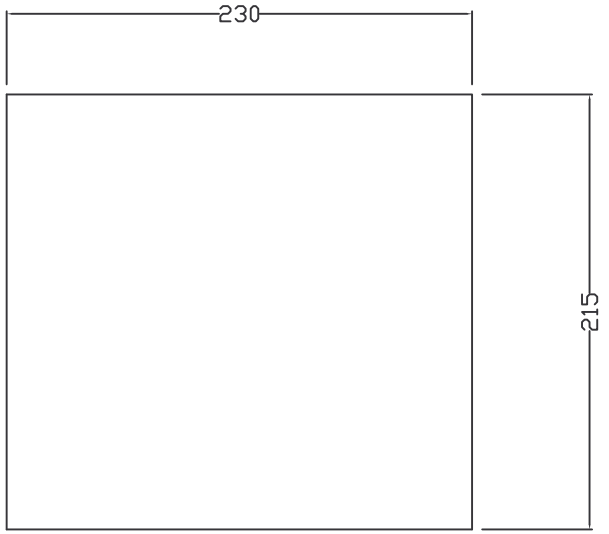




EARTH PIT BASE 5 THICK



EARTH PIT COVER 5 THICK



CONCRETE EARTH PIT BOX

ITEM NO.	DESCRIPTION	STD	DIMENSION	IT.NO. / VAR	MATL. CODE / MATL. SPECN.	A C	UNIT	UNIT WT. / QTY.	GS	ZONE
02	PIT COVER		230x230 5thk		M.S			2kg / 1		
02	PIT BASE		220x220 5thk		M.S			2kg / 1		
01	PIT		230x230X215 5thk		CONCRETE			1		

TYPE OF PRODUCT: UHV LAB

NAME OF CUSTOMER

BHARAT HEAVY ELECTRICALS LTD.
CORPORATE R&D, HYDERABAD

	NAME	SIGN.	DATE	NO.OF VAR.
DRN	MURALI		17.07.09	
CKD	BHOOMAIAH		17.07.09	
APPD	RENGARAJAN		17.07.09	

REV.	DATE	ALTERED / CHECKED	REV.	DATE	ALTERED / CHECKED
ZONE			ZONE		

DEPT. ICH | CODE 26 | GRADE OF TOL. DIM. C/M/F | SCALE NTS | WEIGHT(KG)

REF. TO 309S&TUHV1010 | ITEM NO. | NO.OF ITEMS

TITLE: EARTH PIT

CARD CODE

DRAWING NO. 309S&TUHV1200 | REV.

SHEET NO. | NO. OF SHEETS

INVENTORY NO. | SIGN. AND DATE | REF. DRG. NO.

FIRST ANGLE PROJECTION

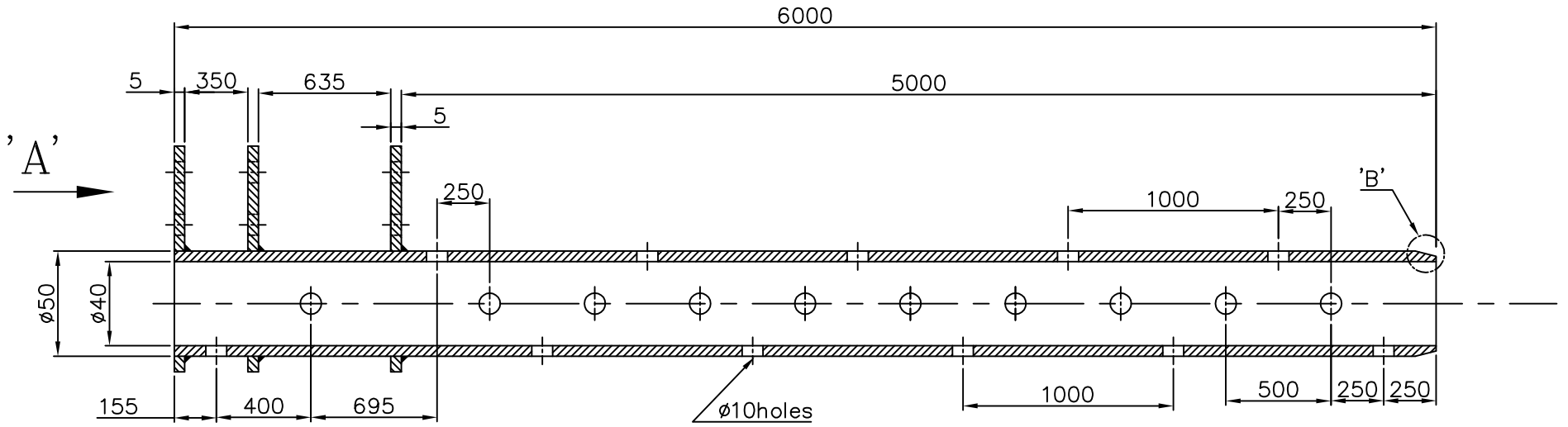
(ALL DIMENSIONS ARE IN mm)

DRG.NO.

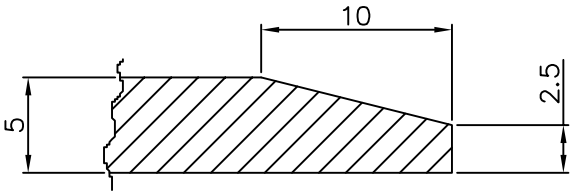
COMP. FILE NAME

REF.DRG.NO.

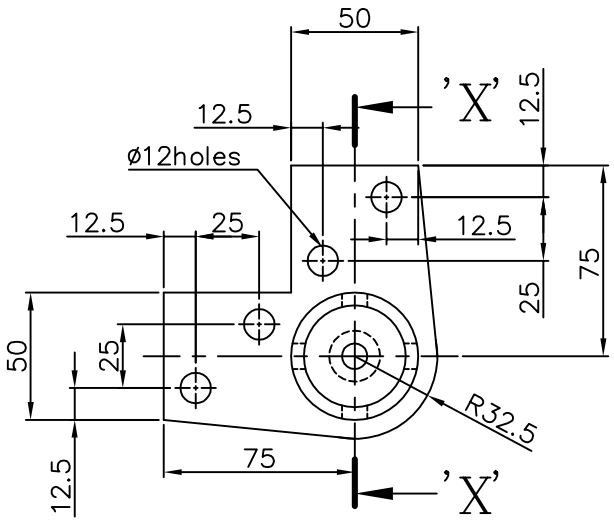
INVENTORY NO.



SECTION–'XX'



DETAIL–'B'



VIEW 'A'

NOTES:

1. HOLES ON THE PIPE TO BE DRILLED IN SPIRAL PATH AS SHOWN
2. COMPONENTS SHOULD BE SILVER BRAZED
3. COMPLETE ASSEMBLY TO BE GALVANISED (HOT DIP) AFTER BRAZING

Material: Copper–25nos

REV.	DATE	ALTERED	CHECKED	APPD.
ZONE				

REV.	DATE	ALTERED	CHECKED	APPD.
ZONE				

REV.	DATE	ALTERED	CHECKED	APPD.
ZONE				

REV.	DATE	ALTERED	CHECKED	APPD.
ZONE				

TYPE OF PRODUCT
OR
NAME OF CUSTOMER/PROJECT

BHARAT HEAVY ELECTRICALS LIMITED
Corp. R&D Division. Vikasnagar
HYDERABAD - 500 093

	NAME	SIGN.	DATE
DRN.			
CHD.			
APPD.			

NO.OF VAR.

DEPT.	SCALE	WEIGHT(Kg)	REF. TO ASSY DRG.	ITEM NO.	NO.OF ITEMS
HVE	NTS				
CODE 34					

TITLE
GROUNDING PIPE

DRAWING NO. 309S&TUHV1012

REV. 00

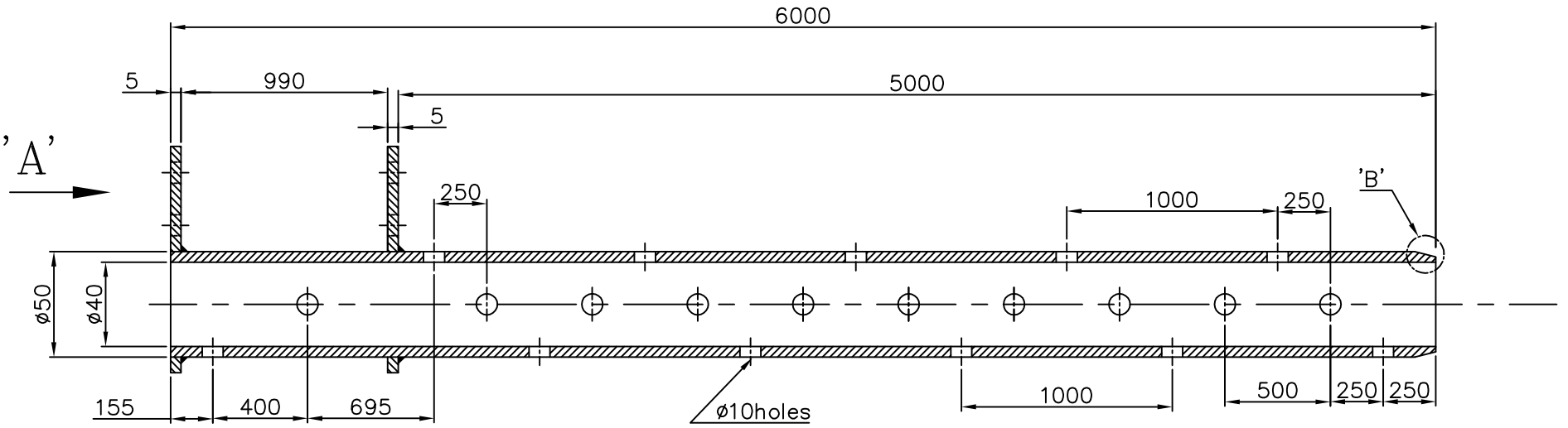
SHEET NO. | NO OF SHEETS

TD–150/REV.NO.03 SIZE A1

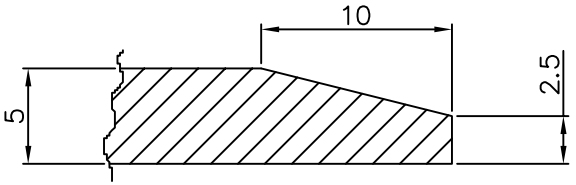
FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

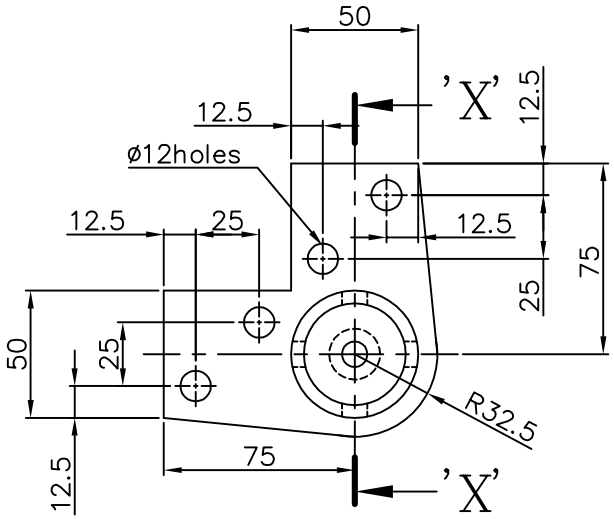
DRG.NO.



SECTION–'XX'



DETAIL–'B'



VIEW 'A'

NOTES:

1. HOLES ON THE PIPE TO BE DRILLED IN SPIRAL PATH AS SHOWN
2. COMPONENTS SHOULD BE SILVER BRAZED
3. COMPLETE ASSEMBLY TO BE GALVANISED (HOT DIP) AFTER BRAZING

Material: GI–15nos

COMP. FILE NAME

REF.DRG.NO.

INVENTORY NO.

REV.	DATE	ALTERED	CHECKED	APPD.
ZONE				

TYPE OF PRODUCT
OR
NAME OF CUSTOMER/PROJECT

BHARAT HEAVY ELECTRICALS LIMITED
Corp. R&D Division. Vikasnagar
HYDERABAD - 500 093

	NAME	SIGN.	DATE
DRN.			
CHD.			
APPD.			

NO.OF VAR.

DEPT.	CODE	SCALE	WEIGHT(Kg)	REF. TO ASSY DRG.	ITEM NO.	NO.OF ITEMS
HVE	34	NTS				

TITLE: GROUNDING PIPE

DRAWING NO. 309S&TUHV1013

REV. 00

SHEET NO. | NO OF SHEETS

TD–150/REV.NO.03 SIZE A1

BHEL Enquiry No 350990561 for Grounding & Earthing System

Enquiry No. 350990561 Dt 16/11/2009 Due on 03/12/2009 for Execution of Grounding and Earthing for UHV Laboratory along with material as per specifications.

Commercial Terms & Conditions:

1. Payment Terms – Please refer loading factors for indigenous purchases attached to this enquiry. Advance payments will attract interest and BG as detailed.

2. EMD and Security Deposit : This purchase order will be issued as Works Contract and hence both EMD and Security Deposit will be applicable. EMD of Rs 1.0 lakh has to be deposited along with the offer and SD of Rs 1 lakh plus 7.5% of the amount exceeding Rs 10 lakhs would have to be deposited by the successful bidder.

3. Price variation clause(PVC):

   LME copper grade A prices in USD per Tonne were;

01.10.09 - $ 6081	03.09.09 - $ 5971
15.10.09 - $ 6076	17.09.09 - $ 6095
30.10.09 - $ 6570	28.09.09 - $ 6490
Average - $ 6286.77 for Oct 09	Average - $ 6164.15 for Sep 09

   PVC prices will be calculated as per following formula

   $$\text{Price quoted / as per PO for each component} \times \frac{\text{Average LME copper grade A price for the previous month of delivery}}{\text{Average LME copper grade A Price for the month of offer}}$$

4. a) Vendors may seek prorata payment for both supply of material and erection of the system.
   b) In such cases, progressive payments will be released based on certification of stage wise work completion.
   c) Detailed BOM with price of each component has to furnished in the offer to avail of prorata payment.

5. Prices should be valid for 90 days from tender opening date.

6. Delivery :The job is expected to be completed approximately by April 2010.